Late Classic and Epiclassic Obsidian at Santa Cruz Atizapan, Toluca Valley, México

Research Year: 2002
Culture: Cacaxtla
Chronology: Late Classic and Epi-Classic
Location: Toluca Valley, México
Site: Santa Cruz Atizapan

Table of Contents

Abstract

In 2002 and 2003, a technological analysis was performed on a collection of 11,000 obsidian objects from the Late Classic and Epiclassic period (*circa* A.D. 500-900) site of

Santa Cruz Atizapan, Toluca Valley, México. This research is part of a broader dissertation project that is attempting to interpret the economic, political and social dynamics that influenced the procurement and use of obsidian in a unique lacustrine environment during a critical period of human occupation in the Toluca Valley. Consistent with most Mesoamerican archaeological assemblages, the obsidian from the Santa Cruz Atizapan site reveals a dominant core-blade technology consisting of modified and unmodified prismatic blade fragments (N=9,399). Prismatic blade scraper, perforator, needle and eccentric forms are represented along with formally and informally shaped non core-blade flake tools (N=220). Projectile points and un-notched bifacially worked tools represent a secondary technology in the obsidian collection (N=337). This report provides a description of the analyzed obsidian and offers preliminary conclusions regarding the role of obsidian within the Santa Cruz Atizapan site during the Late Classic and Epiclassic periods.

Resumen

En 2002 y 2003 se realizó un análisis tecnológico de atributos en una colección de 11,000 objetos de obsidiana excavados en el sitio de Santa Cruz Atizapan, en el Valle de Toluca, México, que fue ocupado desde el Clásico Tardío (450-600 d.C.) hasta el final del Epiclásico (600-900 d.C.). Esta investigación forma parte de una tesis de doctorado diseñada para interpretar la dinámica económica, social, y política que influenció la adquisición y el uso de obsidiana en un ambiente lacustre durante un período crítico en la historia del hombre en el Valle de Toluca. En concordancia con la mayoría de las colecciones arqueológicas de Mesoamérica, la obsidiana del sitio de Santa Cruz Atizapan muestra una tecnología sobre núcleos poliédricos que consiste en fragmentos de navajas prismáticas modificados y sin modificar (N=9,399). Perforadores, agujas y excéntricos se presentan junto con instrumentos formados de lascas talladas por percusión (N=220). Las puntas de proyectil y las bifaciales sin muescas representan una tecnología bifacial secundaria de la colección (N=337). Este informe proporciona una descripción de la obsidiana analizada y ofrece conclusiones preliminares con respecto al papel que jugó la obsidiana en el sitio de Santa Cruz Atizapan, durante el Clásico Tardío y el Epiclásico.

Submitted 11/17/2003 by:
Alexander Villa Benitez
abenitez_1999@yahoo.com

Introduction

During the summer of 2002 and spring of 2003, a Technological Analysis[1] was carried out on more than 11,000 obsidian artifacts excavated from two artificially constructed islands located within the eastern margins of the Chignahuapan lake, Toluca Valley, México (Figure 1). These earthen mounds form part of the Santa Cruz Atizapan island complex that flourished from the Late Classic through the Epiclassic period (*circa* A.D. 500-900) (Sugiura 1998c). The present obsidian research contributes to a growing body of work completed under the auspices of the multidisciplinary research program "El agua, la tierra, el bosque y el hombre en el Alto Lerma: un estudio multidisciplinario," directed by Dra. Yoko Sugiura (Universidad Nacional Autonoma de México). In recent years this research program has focused its efforts on the turbulent Classic and Epiclassic components of the Toluca Valley's prehistory. It is within this framework that the current obsidian research seeks to provide unique insights into local material acquisition and utilization, and ultimately regional exchange systems and political economies.

Situated within the Central Highland region of México directly to the west of the Valley of México, and at an elevation averaging 2600 m, the Toluca Valley stands as the highest basin in the entire country. Geographically the Toluca Valley spans 1600 km^2 and is bordered by volcanic mountain ranges in all four cardinal directions. It is not an entirely closed basin however, as the hills of El Aire, El Aguila and La Venta de Canchemí, forming the northern boundary, permit relatively open access to regions further north. Rising dramatically above the southern valley floor, the Nevado de Toluca and the smaller San Antonio and Molcajete volcanic ranges define the Toluca Valley's southwestern and western boundaries. Three interconnected shallow lakes positioned north to south along the eastern side of the valley, are the most visible geographic features on the landscape. Although an upsurge in the water table may occasionally combine the three lakes into an expansive marshland region extending 30 km^2 N/S by 10 km^2 E/W, the three lakes are individually named (McClung and Sugiura 2002). The highest and southernmost lake, identified as Chignahuapan or Almoloya, sustained the Santa Cruz Atizapan community currently under study. From here the river descends north to lake Chimaliapan, also known as the Lerma, and then winds it way to the Chiconahuapan or San Bartolo lake in the northeastern part of the valley. Together these lakes form the beginnings of the Rio Lerma river system, which runs westward to Lake Chapala in the state of Jalisco and ultimately empties into the Pacific Ocean. The river section connecting Lake Chapala and the Pacific Ocean is known as the Santiago and the entire waterway, from its origins in the Toluca Valley to its point of termination, is designated the Lerma-Chapala-Santiago system. This system represents the longest continuous body of water within the entirety of México. The three lakes at the river's origin in the Toluca Valley are fed by numerous springs occurring along the piedmont of the eastern mountain zone and river tributaries that are in turn filled by water drained from the surrounding mountain slopes (McClung and Sugiura 2002; Sugiura n.d.).

[1] We recorded the presence or variability of those physical attributes that allowed us to place each artifact into the technological typology described by Clark and Bryant (1997). Artifact morphology and their place in the reduction sequence from raw material to finished object are stressed in this approach.

Figure 1. Chignahuapan marsh, Toluca Valley, México.

Settlement History

Throughout its history of human occupation, the Toluca Valley has presented those willing to endure its extremely bitter winter climate, a uniquely rich diversity of wildlife and natural resources. In the eastern lakes region, the successful exploitation of marshland fauna, fish, and vegetation persisted for nearly two thousand years (see McClung and Sugiura 2002: Appendix 3; Sugiura 1998b). Sugiura's recent ethnoarchaeological study of the Toluca Valley's marshland environment has demonstrated the central and enduring role lacustrine resources continue to play in the lives of local people. Beginning in the 1940s, however, underground water pumps were built to transport water from the Toluca Valley to México City in the adjacent Valley of México, effectively lowering the Chignahuapan, Chiconahuapan and Chimaliapan lake levels and greatly impacting the marshland region (Sugiura 1998b:18).

The first settlers appeared in the fertile Toluca Valley during the Early Formative period (circa 1200 B.C.) and their presence is marked by a few small sites with dispersed dwellings. The subsequent Middle Formative period (*circa* 1000-500 B.C.) witnessed increased settlement along the piedmont zones to the west and along river regions, but the net population increase appears to have been minimal within the lacustrine zone of the lake regions. The Late and Terminal Formative periods (500 B.C.–A.D. 200) did not continue this trend, as much of the Toluca Valley appears to have been deserted with only remnant populations remaining. New settlements again appear during the Middle Classic (A.D. 200-400), particularly within the lacustrine zones. McClung and Sugiura (2002) illustrate the significance of the lacustrine zones at that time by noting that extensive areas of remaining land within the valley were not substantially inhabited despite their subsistence potential.

The Middle Classic period also witnessed a continued rise of economic and political power by the Teotihuacán state in the adjacent Valley of México. At its apex in the Late Classic period (A.D. 400-650) Teotihuacán's urban sector included numerous residential compounds, expansive public architecture highlighted by the Sun and Moon pyramids and specialized lithic workshops located on the outskirts of the city (Manzanilla 1995). Complex religious and exchange networks connected the city to nearly every existent site in Mesoamerica. Teotihuacán leaders did not overlook the tremendous woodland resources of the adjacent Toluca Valley, nor its rich lacustrine zones. Sugiura (2001:356) believes that during the Late Classic period, Teotihuacán leaders encouraged and perhaps directed increased settlement in the Toluca Valley to take advantage of the rich lacustrine resources available there.

The number of lake islands constructed increased yet again during the Epiclassic period (A.D. 650-900) as the Toluca Valley absorbed immigrants from the Valley of México seeking refuge following the demise of the Teotihuacán state at the end of the Classic period. A few large pyramid sites, strategically situated at entry points into the Toluca Valley, come into existence during this period. One of these sites is La Campana-Tepozoco which was established among the existing artificial islands on the fringes of lake Chignahuapan. It served as the civic-religious center for a large complex of surrounding islands that comprise the Santa Cruz Atizapan site. Apart from the increased settlement of the lacustrine zones, less hospitable regions of the valley are also intensely populated for the first time during the Epiclassic. The tremendous number of people moving into the valley meant that many of the later arrivals were forced to live in the less populated and unfavorable parts of the valley. Sugiura (1998a:113) notes a particularly large increase in number of sites in the northeastern part of the Toluca Valley.

Recent paleo-climatic data suggests that the construction of artificial islands in the Chignahuapan lake occurred at the inception of a long dry period in the valley when lake levels were their lowest *circa* A.D. 500 (Caballero et al., 2002). To create the earthen islands, soil was brought up from the bottom of the lake and placed into an intricately prepared framework of upright and angled branches which could support the construction of public and domestic structures. Over one hundred islands were eventually constructed in the shallow waters of the Chignahuapan lake. Results of the paleo-climatic study also indicate a substantial rise in lake levels around A.D. 900, which, not coincidentally, corresponds to the abandonment of the entire island complex. We can surmise that rising waters probably caused periodic flooding of the islands and posed drainage problems that eventually forced residents to move elsewhere and abandon the region (Caballero *et al*., 2002).

Santa Cruz Atizapan Obsidian

More than 11,000 obsidian objects were recovered during three seasons of field excavation at the site of Santa Cruz Atizapan (Sugiura 1998c; 2000; 2003). The analysis of this assemblage is significant for three reasons: (1) Obsidian use at the Santa Cruz Atizapan site was adapted to a unique lacustrine environment, (2) The lack of usable obsidian sources in the Toluca Valley meant that its residents must have been provisioned with obsidian from other regions, and (3) The occupation of the Chignahuapan islands from Late Classic through the Epiclassic periods allows us to investigate the changing character of obsidian within the broader political, economic and social restructuring that took place with the demise of the Teotihuacán state at the end of the Late Classic.

The vast majority of obsidian objects are made of grayish-black obsidian which is often translucent and displays a banded color texture[2] (72%). Visual analysis with a 20x hand lens and consultation with other archaeologists leads us to believe that this obsidian was obtained from sources in the current state of Michoacán, northwest of the Toluca Valley. Neutron Activation Analysis is currently underway and will allow us to draw a more significant conclusion regarding the origins of this and other obsidian categories (Figure 2). Semi-translucent black-gray obsidian with a veined color texture represents nearly 14% of the total obsidian. It is distinguished from the previous grayish-black obsidian for several reasons. One, it lacks the distinct gray banding color texture that is found in the other obsidian; two, it displays a consistently veined color texture; and three, it is visually identical to a sample of obsidian obtained from a previously undocumented outcrop in the northern part of the Toluca Valley.[3] This obsidian outcrop has yet to be fully explored and its archaeological value is presently unknown but it does represent the first evidence for a regionally available high quality raw material source. Santa Cruz Atizapan obsidian and samples from the source outcrop will be compared through Neutron Activation Analysis to determine if they are the same material and whether we have evidence for intra-valley procurement of obsidian during the Late Classic and Epiclassic periods. Green obsidian, almost certainly from the Sierra de las Navajas source in the state of Hidalgo, represents 7% of the entire assemblage. The remaining 7% is comprised of black opaque (1%), light gray translucent (1%), dark gray opaque (1%), light brown translucent/iridescent (2%); greenish-gray banded translucent (1.5%) and indeterminate types.[4] These "types" are also currently being sourced via Neutron Activation Analysis.

---

[2] Color Texture denotes the way colors are distributed in the obsidian. Although this grayish-black obsidian is often described as gray colored in other literature, the black color is emphasized to distinguish it from the distinctly gray banding.

[3] The high quality obsidian source was recently located by a Toluca Valley archaeologist who retrieved samples from a road cut near the source region.

[4] Obsidian objects were divided into 25 different "type" categories based on color, color texture, light transmittance, surface luster, surface texture, and the presence of impurities in the material. Many of these categories are condensed and described only by color designations in this report to reflect my confidence that the N.A.A. study will establish that many types represent variations of the same obsidian source. As such it also facilitates a discussion of the preliminary conclusions offered here

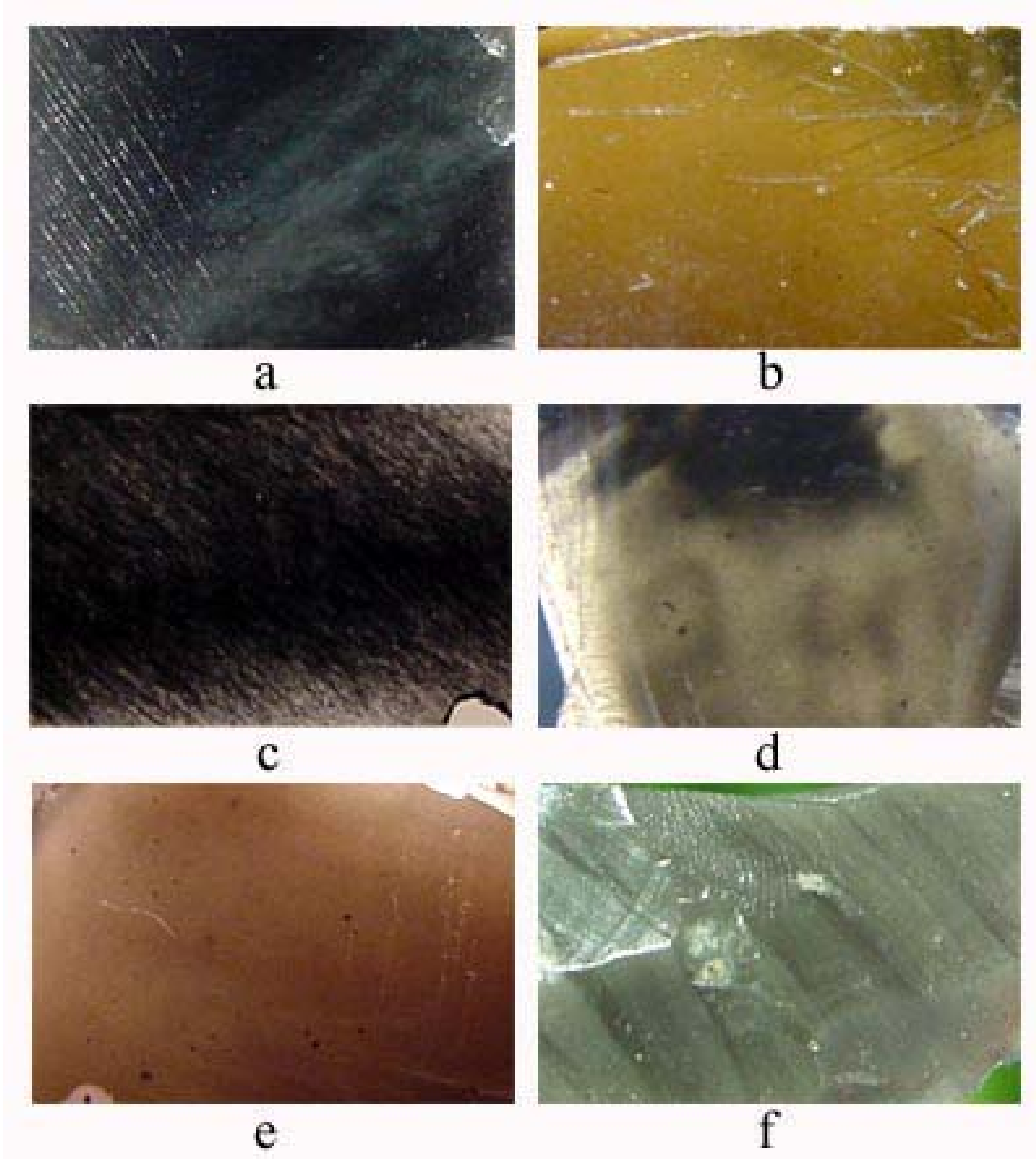

Figure 2. Obsidian "types": (a) grayish-black, (b) green, (c) black-gray "Toluca Valley", (d) gray, (e) brown, (f) greenish-gray.

The majority of obsidian artifacts are what Clark and Bryant (1997) termed third series prismatic blades (Figure 3). The consistently shaped blades have parallel cutting edges and dorsal ridges. Their trapezoidal longitudinal cross-section creates the "prismatic" facets that give the objects their name. Because these objects represent the final product in core-blade technology and because there is limited evidence for substantial obsidian working at the site, it seems that obsidian objects arrived at the Santa Cruz Atizapan site as finished, ready to use objects. The small numbers of polyhedral cores present in the assemblage are exhausted and further suggest that few if any prismatic blades were produced locally from imported cores. Several antler tines were recovered during excavations but these could have been used for pressure flaking prismatic blades, worn bifaces and other tools. Despite this, we must still consider the possibility that Epiclassic period obsidian workshops located within the boundaries of the nearby La-Campana civic-religious center might have provisioned the surrounding islands with prismatic blades. Only future work at the La-Campana site and at more man-made islands will offer a clear indication.

Twenty-five polyhedral core fragments were identified during the analyses. Sixteen of these 25 cores are so fragmented that they represent less than 25% of their estimated pre-break size. Only two cores were found to be complete specimens. Twelve cores are of the grayish-black variety, while 11 were recorded to be the black-gray variety which may be local to the Toluca Valley. Only 2 core fragments are of green obsidian. All of the cores are thin and exhausted; very likely at or near the end of their use as polyhedral cores.

Numerous obsidian tools were produced by simply pressure-flaking broken segments of prismatic blades. Several identified forms are consistent with those found at many Mesoamerican sites (see Figure 3). Needles (N=35), eccentrics (N=83), and projectile points/hafted bifaces (N=12) are the most recognizable objects made from blades. Needles, used for blood-letting rituals throughout much of Mesoamerica, average 6 mm in width and 2.5 mm in thickness. Our sole complete needle is pointed on both ends and measures 59 mm in length. Grayish-black, gray and green obsidians are nearly equally represented, but surprisingly, 40% (N=14) are made from brown translucent obsidian.

Prismatic blade segments were also fashioned into crescent and trilobed eccentrics. These are most often made of the abundant grayish-black obsidian (N=42) although a few are made of green, gray and black-gray obsidian. Their modification varies greatly as some are well shaped and others poorly pressure flaked. None exhibit evidence of having been shaped or polished by abrasion. Projectile points made from prismatic blades are few in number and it is not surprising to note that all but two are made of the most common grayish-black obsidian at the site. These objects tend to have only their outer edges bifacially modified. The small number of prismatic blade projectile points recovered suggests that they were not as highly regarded as regular hafted and unhafted bifaces.

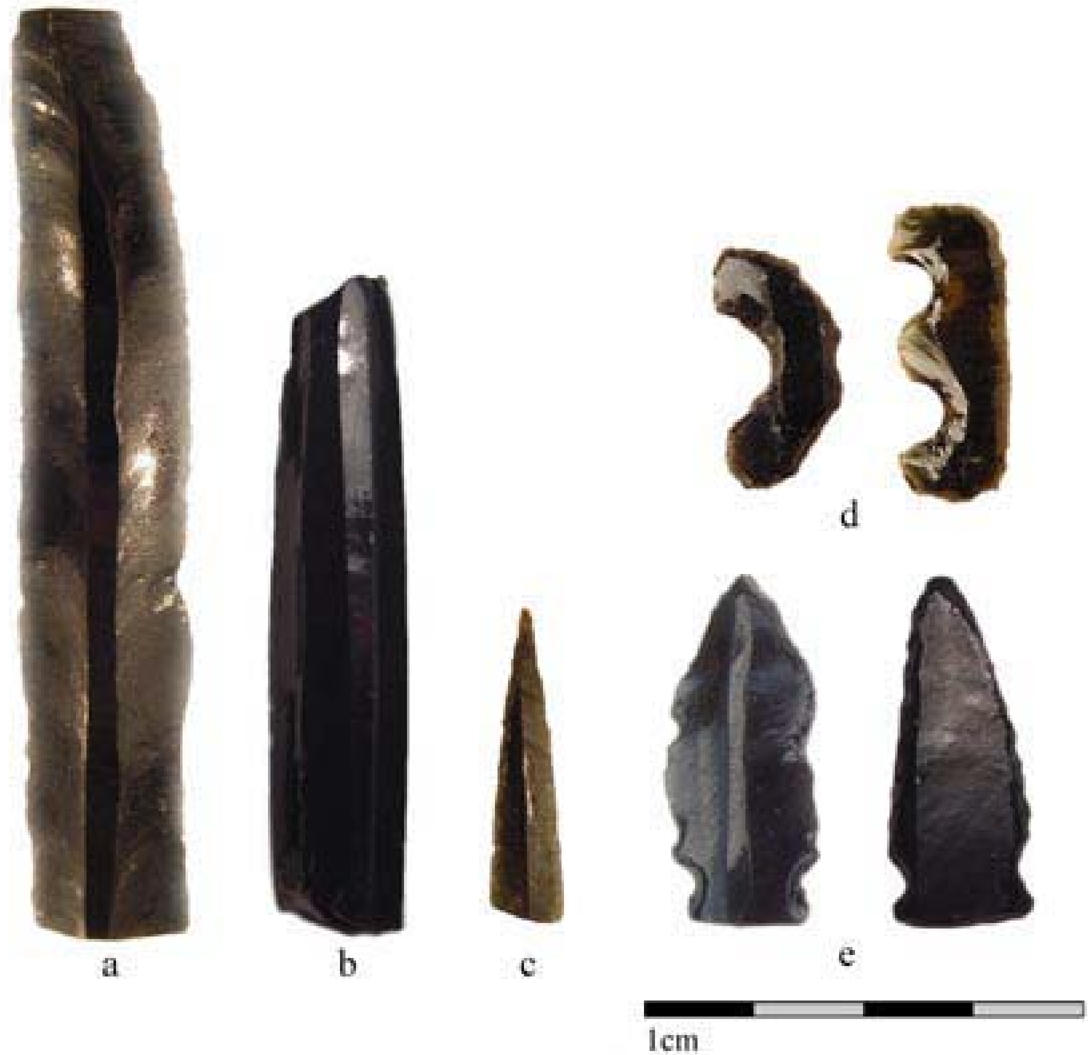

Figure 3. Prismatic blade based tools; (a) unmodified prismatic blade segment, (b) exhausted polyhedral core, (c) "needle" form, (d) eccentrics, (e) projectile points.

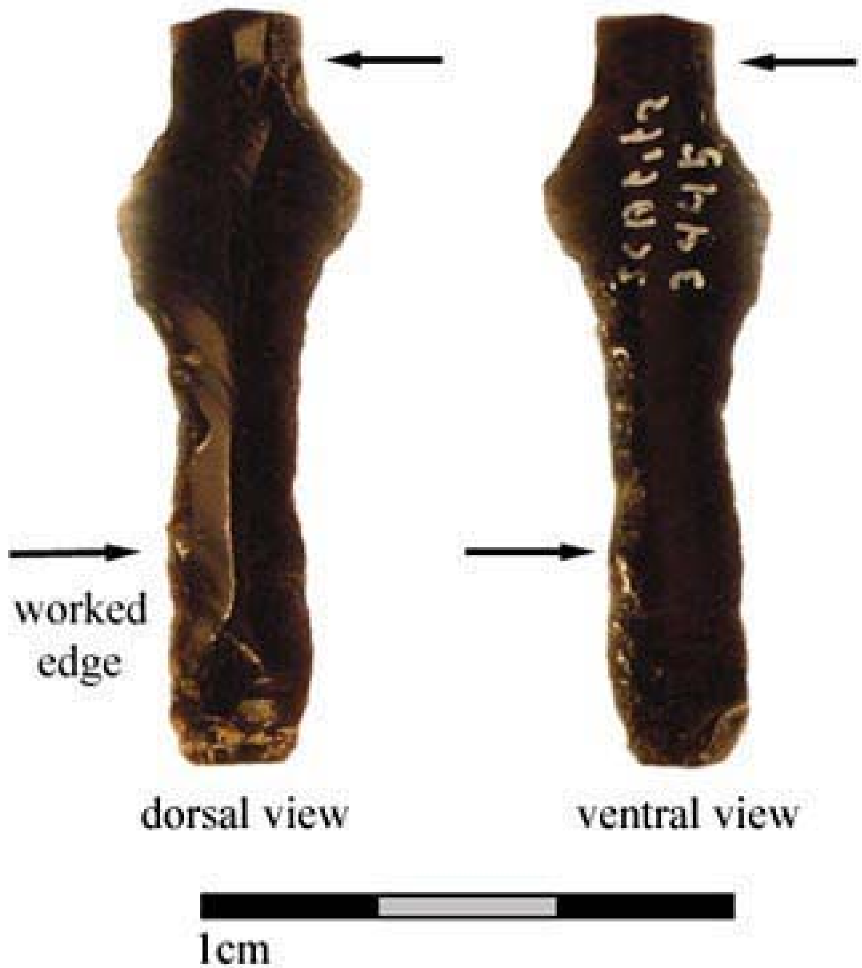

Figure 4. Utilized "T-shape" prismatic blade.

Of interest in the Santa Cruz Atizapan obsidian are prismatic blades modified to create alternating cutting edges by pressure flaking both dorsal and ventral surfaces (N=74) (Figure 4). Lateral projections, the width of the original blade, are often left at the blade's midpoint creating a top and bottom half. The remaining blade sections are then intensively pressure flaked in a consistent pattern. Viewed from the dorsal surface, with the prismatic facets of the blade facing up, the bottom-left and upper-right edges of the blade are heavily retouched. The opposing upper-left and bottom-right edges are alternately retouched on the ventral side of the blade. All of these tools are made of grayish-black obsidian. Their function has not been determined, but we do believe they were used in domestic utilitarian contexts because they are widely distributed at the site and were not recovered from ritual or ceremonial contexts.

Hafted and unhafted bifaces make up 3% of the entire assemblage (N=312). These tools are produced by percussion and pressure flaking both faces of an obsidian blank. They represent a completely different technology than that utilized to produce prismatic blades. Hafted bifaces include side, corner and basal notched projectile points (Figure 5). The variation in form and hafting location are notable in this assemblage. The majority of bifaces are made from grayish-black obsidian (N=134), but surprisingly we found that greenish-gray was the second most common obsidian identified (N=50). Brown (N=34) and Pachuca green obsidian (N=34) are also well represented. The only two non-obsidian bifaces recovered from the Santa Cruz site are made of red rhyolite and quartzite.

Figure 5. Hafted and Unhafted obsidian bifaces from Santa Cruz Atizapan.

Obsidian Use

A 20x hand lens was used to identify wear patterns on the edges and surfaces of nearly 9,000 objects. The extent to which obsidian objects were used, re-sharpened and reused can provide us with information regarding the value or scarcity of the material and their importance for accomplishing daily tasks. In this assemblage it might also indicate a specialization of use adapted to lacustrine environments. Over 37% of the obsidian exhibited intensive surface modifications indicative of use. This is a very conservative percentage because we only recorded use if it was distinctly visible on an object and it could not be attributed to accidental breakage or post-depositional processes. In a sample of 3,097 utilized flake tool and prismatic blade artifacts, 55% were used on more than two-thirds of their existing edge lengths. An additional 28% of this sample displayed use wear scars on more than one-third of their edges present. It thus appears that great efforts were made to fully utilize the imported obsidian material. The variability in hafted biface forms noted earlier may further reflect a conscientious effort to rework and reuse bifaces that shattered with use. Blades of projectile points are often reworked and reused as long as the hafting element remains intact.

The excavated islands 20 and 13 of the Santa Cruz Atizapan site represent public and domestic areas, respectively. Despite this, the initial analysis of the obsidian suggests that it was not used very differently in either context. It appears that obsidian was used almost exclusively to complete basic functional tasks in both public and domestic contexts. Artifacts often associated with ritual or high status are lacking in the assemblage. Aside from the needles that may have been used for blood-letting and the crudely made eccentrics which may have some ritual significance (Stocker and Spence 1973) all of the remaining artifacts served basic cutting, scraping and perforating tasks. This does not however, preclude the use of simple tools such as prismatic blades to perform ritual, funerary or other non-secular activities. At the Santa Cruz Atizapan site obsidian objects may simply not have been specifically modified to perform these tasks. It is also uncertain whether specialized activity areas are indicated by the distribution of obsidian. Presently it does not appear that specialized tasks utilizing obsidian were limited to certain parts of either island.

What then does this preliminary data suggest about obsidian use at the Santa Cruz Atizapan site? The intensity of use wear macroscopically visible on many prismatic blades demonstrates a great effort to use obsidian to its fullest potential. This may have become more imperative during the transition to the Epiclassic period when obsidian was no longer imported into the valley via the Teotihuacán network. Toluca Valley residents had to locate an alternative source for their obsidian and establish a trade network that would provide them with finished prismatic blades, bifaces, etc. It is therefore not surprising to find that highly crafted obsidian objects were not recovered from Mound 20, where a continual series of superimposed public structures were constructed with numerous accompanying ritual offerings. The need to conserve obsidian material is further highlighted by the absence of alternative lithic materials which could have been used instead of obsidian.

The recovered faunal materials and richness of the lacustrine zone undoubtedly establish that the lake region was primary in the lives of the Santa Cruz Atizapan people. Evidence for hunting, gathering and fishing is represented in the material culture. Local lithic strategies must therefore be representative of those tasks, as they were adapted for use in a lacustrine zone. It does not appear that very many tools, aside from hafted bifaces, were specialized to perform specific tasks. Instead a more generalist approach was implemented. It would have been more efficient to conserve materials by adapting the tool to the task at hand. This strategy only succeeds if you are able to carry objects that could easily be modified for use. Prismatic blades, (85% of the assemblage) were perhaps the easiest functional cutting tool to carry with you. It could be modified for cutting, scraping, piercing in very little time by a non-specialist.

Obsidian Exchange

The absence of high quality obsidian within the Toluca Valley meant that its residents had to rely on a network of obsidian exchange to obtain the basic tools they needed for performing everyday tasks. At the inception of human settlement in the Chignahuapan lake region during the Late Classic period (A.D. 500), it appears that this network was secured by the leaders of Teotihuacán who in return desired the lacustrine products of the marshland regions. Green obsidian from the Sierra de las Navajas mines was imported as prismatic blades, bifaces and large flake tools. During the Middle and Late Classic periods, obsidian workshops were one of the most developed industries at Teotihuacán. Obsidian from the earliest occupation levels at the Santa Cruz Atizapan site support the argument for a Teotihuacán based exchange network. Ceramics provide much stronger evidence linking the Toluca Valley and the Valley of México. Numerous Teotihuacán clay figurines were imported to the site along with Teotihuacán style pottery and locally manufactured copies of Teotihuacán pottery. Throughout much of its history the population of the Toluca Valley is intricately tied to the Valley of México and thus much of its material culture reflects that connection.

At around A.D. 650, the breakdown of Teotihuacán trade networks caused significant turmoil for much of México's Central Highland region. As the reliable supply of green obsidian becomes less and less secure, the Santa Cruz Atizapan people look north to the obsidian sources in the current state of Michoacán. The obsidian from the Ucareo and Zinapecuaro sources is widely traded throughout the highland region of México during the Epiclassic period. We are not sure who brought the obsidian to the region but we are fairly sure that it was not directly procured by the local people. There is again, evidence for the continued importation of prismatic blades, but we also begin to see larger macroblades and a more varied assemblage of artifacts made from large flakes and modified macroblades. It does not appear that the subsistence technology changed because it was still tied to the local lacustrine environment. Rather, it appears that the exceedingly formalized Teotihuacán obsidian trade network was replaced by a less structured and flexible system from the north that offered a greater variety of materials to valley residents. We must keep in mind that during the Epiclassic, the Santa Cruz Atizapan site was one component of the La Campana-Tepozoco complex which probably controlled the southeastern part of the Toluca Valley. Perhaps this political power allowed them to dictate the types and quantities of obsidian tools imported by itinerant traders. The significance of these shifting obsidian networks is still to be fully explored once the sourcing studies and a more detailed contextual study are completed.

List of Figures

Sources Cited

Caballero, Margarita *et al.*
2002 "Santa Cruz Atizapan: a 22-ka lake level record and climatic implications for the late Holocene human occupation in the Upper Lerma Basin, Central México." In *Palaeo*186:217-35.

Clark, John E. and Douglas Donne Bryant
1997 "A Technological Typology of Prismatic Blades and Debitage from Ojo de Agua, Chiapas, México." In *Ancient Mesoamerica* 8:111-36.

Manzanilla, Linda
1995 "La Zona Altiplano Central en el Clásico." In *Historia Antigua de México Vol. II: El Horizonte Clásico.* 1st ed., edited by Linda Manzanilla, and Leonardo Lopez Lujan, 139-73. México City: INAH.

McClung de Tapia, Emily and Yoko Sugiura
2002 "Prehispanic Life in a Man-made Island Habitat in Chignahuapan Marsh, Santa Cruz Atizapan, State of México, México." FAMSI grant report.

Stocker, Terrance L. and Michael W. Spence
1973 "Trilobal Eccentrics at Teotihuacán and Tula." In *American Antiquity* 38, 2:195-99.

Sugiura Yamamoto, Yoko
1998a "Desarrollo Histórico en el Valle de Toluca antes de la conquista Española: Proceso de Conformación pluriétnica." In *Estudios de Cultura Otopame.,* pp. 99-122, vol 1, no. 1. México: Instituto de Investigaciones Antropológicas, UNAM.

1998b "La Caza, La Pesca, y La Recolección: Etnoarqueología del modo de subsistencia lacustre en las ciénagas del Alto Lerma." México: UNAM.

1998c "El agua, la tierra, el bosque y el hombre en al Alto Lerma: un estudio multidisciplinario" Fase II. *Informe técnico del Proyecto Arqueológico de Santa Cruz Atizapan.* México: UNAM.

2000 "El agua, la tierra, el bosque y el hombre en al Alto Lerma: un estudio multidisciplinario" Fase II. *Informe técnico del Proyecto Arqueológico de Santa Cruz Atizapan: Segunda Temporada.* México: UNAM.

2001 "La Zona del Altiplano Central en el Epiclasico." In *Historia Antigua de México Vol. II: El Horizonte Clásico,* edited by Linda Manzanilla and Leonardo Lopez Lujan, pp. 347-90. México City: INAH.

2003 "El agua, la tierra, el bosque y el hombre en al Alto Lerma: un estudio multidisciplinario" Fase II. *Informe técnico del Proyecto Arqueológico de Santa Cruz Atizapan.* México: UNAM.

In Press "El Hombre y la Region Lacustre en el Valle de Toluca: Proceso de Adaptación en los Tiempos Prehispanicos." In *IV Coloquio Bosch Gimpera.*